

Claims

1. ~~In a phased array, phase-amplitude monopulse~~  
radar antenna arrangement, a radar subsystem  
comprising:

5 a phased array antenna including a plurality of  
radiating elements in phased-relationship to one  
another and disposed in substantially horizontal rows  
defining a surface contour and a boresight orthogonal  
10 to a central region of said surface contour, said  
antenna defining separate regions for generating  
corresponding separate beams of radiation, said  
separate regions being vertically separated with  
respect to one another into upper and lower regions,  
15 said beams being horizontally skewed left and right  
from the boresight line;

feed means for coupling a predetermined  
illumination pattern to said phased array antenna,  
said feed means including sum and difference feed  
means for coupling respective sum and difference  
20 monopulse information from said antenna to a signal  
processing means for interpreting radar return  
signals; and

a plurality of phase shift means for  
controllably modifying the phase of electromagnetic  
25 energy coupled between said feed means and said  
phased array antenna;

a  
said upper and lower regions of said  
phased array antenna being <sup>physically</sup> set in oppositely disposed  
directions, whereby said monopulse information  
30 provided to said signal processing means provides a  
basis for developing target indications with respect  
to elevation angle and azimuth.

2. ~~The method of establishing a phased array,~~  
phase-amplitude monopulse radar antenna arrangement  
including a radar subsystem, said method comprising  
the steps of:

- 5 (a) placing a plurality of electromagnetically  
radiating elements in phased-relationship to one  
another to establish a phased array antenna, said  
radiating elements being disposed in substantially  
horizontal rows defining a surface contour and a  
10 boresight orthogonal to a central region of said  
surface contour, said antenna defining separate  
regions for generating corresponding separate beams  
of radiation, said separate regions being vertically  
separated with respect to one another into upper and  
15 lower regions, said beams being horizontally skewed  
left and right from the boresight line;
- (b) coupling a feed means to said phased array  
antenna for applying a predetermined electromagnetic  
illumination pattern to said phased array antenna,  
20 said feed means including sum and difference feed  
means for carrying respective sum and difference  
monopulse information from said antenna to a signal  
processing means for interpreting radar return  
signals;
- 25 (c) interposing between said feed means and said  
phased array antenna, a plurality of phase shift  
means for controllably modifying the phase of  
electromagnetic energy coupled between said feed  
~~means and said phased array antenna;~~

(d) disposing said upper and lower regions of  
said phased array antenna in <sup>physically</sup> oppositely disposed  
directions, whereby said monopulse information  
provided to said signal processing means provides a  
5 basis for developing target indications with respect  
to elevation angle and azimuth.

3. The invention of claims 1 or 2, wherein said  
feed means includes a plurality of coupling means for  
directionally coupling electromagnetic energy with  
10 respect to each of said horizontal rows of radiating  
elements, each of said coupling means being effective  
for communicating electromagnetically with each of  
said sum and difference feed means.

4. The invention of claims 1, 2 or 3, wherein each  
15 of said plurality of phase shift means is effective  
for controllably modifying the phase of  
electromagnetic energy coupled between said feed  
means and a single one of said horizontal rows of  
radiating elements.

20 5. The invention of claims 1 or 2, wherein said  
radar subsystem further comprises a signal processing  
~~means for interpreting radar return signals.~~